

In re application of DUJARI
Serial No. 09/703,381

REMARKS

The Office action has been carefully considered. The Office action has rejected claims 37-52 under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,230,200 to Forecast et al. ("Forecast"). Applicant respectfully disagrees.

By present amendment, claim 37 has been amended for clarification and not in view of the prior art. Applicant submits that the claims as filed were patentable over the prior art of record, and that the amendments herein are for purposes of clarifying the claims and/or for expediting allowance of the claims and not for reasons related to patentability. Reconsideration is respectfully requested.

Prior to discussing reasons why applicant believes that the claims in this application are clearly allowable in view of the teachings of the cited and applied references, a brief description of the present invention is presented.

The present invention is directed, generally, to a system and method for enhancing file system performance by automatically balancing files among randomly-named subdirectories that have content cached therein as files with predictable filenames and by limiting the number of files in any directory. Certain file systems may experience degraded performance when more than a certain number of files are in the same directory. The balancing mechanism of the present invention operates to avoid such degraded performance. To this end, the balancing mechanism is able to track the number of files in each directory (and subsequent cache directory) and may determine whether more directories (and subsequent cache directories) need to be created. When one or more

In re application of DUJARI
Serial No. 09/703,381

additional directories are needed, the balancing mechanism determines how many directories to create and creates that many directories.

Thus, when new files are added, the balancing mechanism distributes the files among the various directories based on the directory that has the least number of files. If the number of files in the selected directory plus the number to be stored exceeds a predetermined threshold amount, then directories may be created. If no more directories may be created, then files may be removed from existing directories (such as those which have not been accessed for the longest time).

Note that the above description is for general informational purposes only, and is in no way intended to limit the claims, which are discussed below.

Turning to the claims, independent claim 37 recites a computer-implemented method, comprising generating a plurality of subdirectory names, wherein each subdirectory name is random, creating a plurality of randomly-named cache directories, one for each random subdirectory name generated, such that each randomly-named cache directory created is uniquely associated with a corresponding randomly-named subdirectory, storing a plurality of files under the plurality of randomly-named cache directories, each of the plurality of files having a predictable filename, and automatically balancing the files among each of the plurality of randomly-named cache directories.

As maintained from previous Office actions, the current Office action rejected claim 37 as being anticipated by Forecast. More specifically, the Office action contends that Forecast teaches generating a plurality of subdirectory

In re application of DUJARI
Serial No. 09/703,381

names, wherein each subdirectory name is random. Column 8, lines 26-30 of Forecast is referenced. Further, the Office action contends that Forecast teaches creating a plurality of randomly-named cache directories, one for each random subdirectory name generated. Column 67, lines 40-47 of Forecast is referenced. Still further, the Office action contends that Forecast teaches storing a plurality of files under the plurality of randomly-named cache directories, each of the plurality of files having a predictable filename. Column 2, lines 14-16 of Forecast is referenced. Finally, the Office action contends that Forecast teaches automatically balancing the files among each of the plurality of randomly-named cache directories. Column 67, lines 40-47 of Forecast is referenced. Applicant respectfully disagrees.

As has been put forth before, Forecast teaches, generally, a system and method for allocating component resources when streaming data from a video file server. More particularly, Forecast describes creating a dynamic model of the configuration of components for data handling in the video file server and allocating the components for routing a video stream. The model includes assemblies and subassemblies in the video file server. The major sub-assemblies include a stream server, a cached disk array and a tape silo. Within these major sub-assemblies, the cached disk array includes micro-processor cards that are programmed to function as channel directors or disk directors. Each of the channel directors is interfaced through one of a number of SCSI adaptors to the SCSI interface of one of the stream servers. With this architecture in place, the channel directors access data in the cache memory in

In re application of DUJARI
Serial No. 09/703,381

response to a request from its associated stream server. If data to be read by a channel director is not found in cache memory, the data is transferred from the disk array to the cache memory. Thus, a controller at the file server is configured to automatically create the dynamic model, modify the dynamic model in response to component changes such as component failures, and allocate component resources for routing the video stream and balance allocations of component resources to video streams.

The Office action once again, however, has erroneously equated the capability of the processor in Forecast to balance allocations of component resources to video streams with the capability (which is recited in claim 37) of automatically balancing files among each of a plurality of randomly-named cache directories. More specifically, a video component resource and a video stream cannot be construed to be the same as a file and its relationship to both a randomly-named subdirectory and its associated cache directory. Simply put, a video component resource/video stream relationship cannot possibly anticipate a file/sub-directory/cache directory relationship if only, notwithstanding several other reasons, because Forecast teaches a relationship between two objects and claim 1 recites a relationship between three objects. Even still, additional reasons that Forecast does not anticipate claim 1 are detailed further below.

The allocation balancing program described in Forecast may free resources of a heavily loaded cached disk array including a file system containing a video stream for which a copy is stored in the file system in another cached disk array. In this case, the path of the existing stream of data from the

In re application of DUJARI
Serial No. 09/703,381

heavily loaded cached disk array would be dynamically changed to originate from the copy of the video stream in the other file server in order to free resources of the heavily loaded cached disk array. That is, Forecast teaches balancing of data streams via components available in a video file server.

Significantly, Forecast does not describe balancing files among directories let alone balancing among cache directories that have a specific relationship to a randomly named sub-directory, as recited in claim 37. Nor does Forecast describe distributing new files that are added among the various directories, as described in other dependent claims. Rather, Forecast merely describes allocating components in a video file server for streaming video data.

Automatically allocating components in a video file server for streaming video data according to a predetermined balanced routing configuration is not the same as automatically balancing files among each of a plurality of randomly-named cache directories, each of which are associated with a unique randomly-named subdirectory.

In fact, despite the Office action's refutation, Forecast clearly teaches away from load balancing files. In describing the components of the video file server, Forecast describes two physical file systems: a conventional UNIX File System and a Continuous Media File System (CMFS). The CMFS file system that is used for storing the video data streams may span several disks within a CMFS volume set. When a new CMFS file is created, it is written in a "stripe" across all the disks within the volume set. Forecast specifically states that "[t]he reason for multi-disk volume sets is to increase capacity rather than provide load

In re application of DUJARI
Serial No. 09/703,381

balancing." Forecast then further explains that *load balancing for video streams may be accomplished by exporting multiple file systems.* (See Col 11:9-15).

Thus, Forecast admits that load balancing must necessarily be achieved by a system outside the scope of what is described in Forecast. Simply stating that load balancing *may* be accomplished is certainly not the same as teaching how to accomplish load balancing within the confines of Forecast's described system. Such a stretch of logic would be akin to saying that a novel and non-obvious gasoline engine that could possibly be improved with better gas mileage anticipates an electric automobile because an electric automobile is very gas-efficient.

Thus, applicant still maintains that Forecast teaches away from applicant's invention. Forecast's technique optimizes reading video content and does not load balance files among directories. Forecast also teaches away from applicant's invention by allocating across all disks within a volume set to increase capacity and suggests that load balancing of video content may be accomplished by exporting multiple file systems.

Notwithstanding the reiterated and enhanced arguments detailed above, claim 37 has been amended to recite creating a plurality of randomly-named cache directories, one for each random subdirectory name generated, such that each randomly-named cache directory created is uniquely associated with a corresponding randomly-named subdirectory. Clearly, Forecast does not teach the relationship between a cache directory and a subdirectory wherein both are uniquely associated with each other and the corresponding random names. At

In re application of DUJAR
Serial No. 09/703,381

best, Forecast teaches a random access memory that may include cached memory for storing data of video streams, but simply teaches a single allocation for memory as opposed to a relationship between different allocations of memory as recited in claim 37. For at least the foregoing reasons, applicant submits that claim 37 is allowable over the prior art of record.

Applicant respectfully submits that dependent claims 38-52, by similar analysis, are allowable. Each of these claims depends either directly or indirectly from claim 37 and consequently includes the recitations of independent claim 37. As discussed above, Forecast fails to disclose the recitations of claim 37 and therefore these claims are also allowable over the prior art of record. In addition to the recitations of claim 37 noted above, each of these dependent claims includes additional patentable elements.

For example, claim 40 recites the computer-implemented method of claim 37, wherein automatically balancing files among each of the plurality of randomly-named cache directories includes determining when a randomly-named cache directory has a number of files stored therein that exceeds a limit. As discussed above, Forecast does not teach automatically balancing files among each of the plurality of randomly-named cache directories. Thus, Forecast cannot possibly be construed to teach determining when a randomly-named cache directory has a number of files stored therein that exceeds a limit as recited in claim 40. The only limitations taught by Forecast regarding the allocation of a video stream file is the capacity of a particular resource. A particular resource may be limited by a number of factors including load demand,

In re application of DUJAR
Serial No. 09/703,381

processor speed, etc. but certainly not the actual number of files that may be associated with the particular resource. Applicant submits that claim 40 is allowable for at least this additional reason.

As another example, claim 47 recites the computer-implemented method of claim 37, further comprising, maintaining an index including a directory name for each of the plurality of randomly-named cache directories, and for each directory name, maintaining a file count of a number of files stored therein. As discussed above, Forecast does not teach dealing with files among each of a plurality of randomly-named cache directories. Thus, Forecast cannot possibly be construed to teach maintaining a file count of a number of files stored therein. The only limitations taught by Forecast regarding the allocation of a video stream file is the capacity of a particular resource. A particular resource may be limited by a number of factors including load demand, processor speed, etc. but is certainly concerned with the actual number of files that may be associated with the particular resource. Applicant submits that claim 47 is allowable for at least this additional reason.

For at least these additional reasons, applicant submits that all the claims are patentable over the prior art of record. Reconsideration and withdrawal of the rejections in the Office action is respectfully requested and early allowance of this application is earnestly solicited.

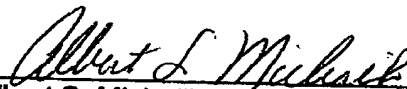
In re application of DUJARI
Serial No. 09/703,381

CONCLUSION

In view of the foregoing remarks, it is respectfully submitted that claims 37-52 are patentable over the prior art of record, and that the application is in good and proper form for allowance. A favorable action on the part of the Examiner is earnestly solicited.

If in the opinion of the Examiner a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney at (425) 836-3030.

Respectfully submitted,



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